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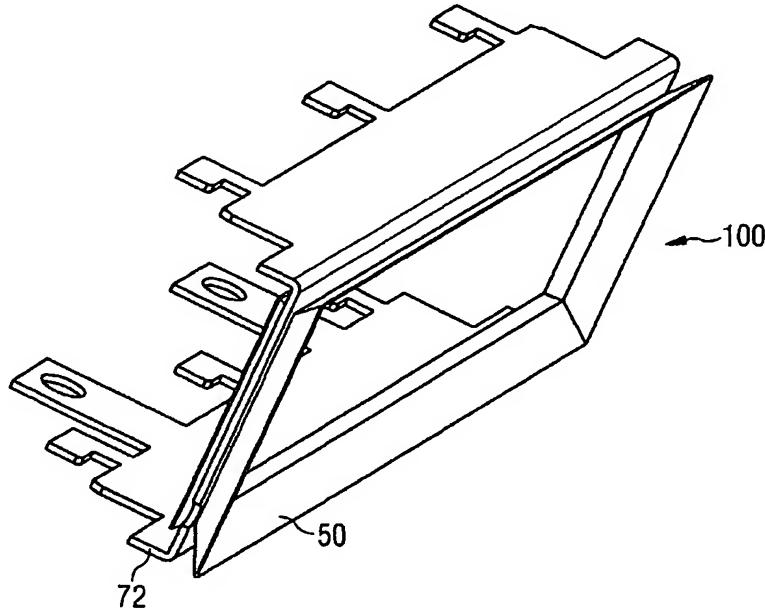
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(54) Title: COMPONENT CARRIER



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(57) Abstract: The present invention relates to a component carrier which includes a frame (72) and a sealing lip (50). The frame includes walls defining an internal opening. The frame may be made of metal and the sealing lip of thermoplastic elastomer. The sealing lip is a single piece which is applied to the frame by injection molding or spraying. The frame may further include recesses or openings along the walls defining its cavity. The cooling thermoplastic elastomer may then grip or adhere to the walls so as to retain its shape. The current invention provides increased compensation tolerances for components accommodated therein.



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## Description

## COMPONENT CARRIER

5       The present invention relates to the general field of carrier components and more particularly to an improved carrier for components, the components including displays and the like, as set out in claim 1 and to a method for making such carriers as set out in claim 9. Component carriers  
10 generally comprise a frame surrounded by a sealing lip. The combination of the frame and lip form a frame in which a component may be housed. The components generally include displays and other such sensitive electronic devices. The devices generally define a front and rear direction depending  
15 upon application of the component. For example, a display defines a front direction which projects forward to an intended viewer displayed information. The rear of a display is generally characterized by electronic components in need of protection against mechanical stresses as well as  
20 environmental effects. The aforementioned stresses and effects adversely impact and therefore limit utility of the life of the component. The stresses and effects generally arise out of implementation and environment of use.  
Continuing with the display example, a common application for  
25 displays is in automobiles and other moving vehicles. Such vehicles exist in a rugged world subject to external impacts being both mechanical force, as due to typical application of the vehicle, and environmental effects depending upon the vehicle operating environment. An additional source of  
30 stress and effect arise during assembly, both of the component to carrier and carrier into a larger (e.g. vehicular) housing. The stress and effect typify the problems facing use of components in intended, sometimes

harsh, working environments. Accordingly, a solution or need exists for a component carrier that offers tolerance against stress and effect.

Current solutions to the above problem include applying  
5 two separates seals to a metal frame. Such seals generally are made of foam and comprise loose-bending pieces. Use of such seals include several problems. Application of the seals requires supporting tools of high position precision along with a visual inspection capability. Such tools are  
10 required given the variety of metal frames in application to which the seals are to be applied. In addition, given the foam composition, the seals tend to be not so deformable, thereby not providing a high degree of mechanical force absorption or protection. In addition, such seals include a  
15 high cycle time which reduces functional expediency of both carrier and component. Accordingly, a need or solution exists for a component carrier with improved resistance to mechanical and environmental stresses as well as improved manufacturing.

20 A solution to the above problems is set out by the present invention. The present invention is directed to a component carrier which includes a combination of a frame and a single sealing lip. The frame may be made of metal and include walls defining an interior cavity. The sealing lip  
25 may be made of thermoplastic elastomer formed in a double sided sealing lip.

An object and advantage of the present invention is therefore to provide the above component carrier combination in a cost efficient and effective manner. This and other  
30 objects and advantages are achieved by the sealing lip being dovetailed with a first arm longer than a second arm. The first arm may face front, a direction defined by application of the component. The sealing lip may further be applied by

a spraying process or an injection molding process, the both of which are well known in the art, less expensive than other processes and not requiring sophisticated equipment.

Further, the present carrier component may include recesses 5 or openings along a surface of the walls defined the interior cavity. The openings may be an open V shape facing into the cavity. The recesses provide for a gripping point for the elastomer to adhere to during the cooling process.

Accordingly, the sealing lip can maintain its form.

10 These and further aspects and advantages of the invention will be discussed more in detail hereinafter with reference to the disclosure of preferred embodiments, and in particular with reference to the appended Figures that show:

15 Figure 1 depicts a first view of a first frame according to an embodiment of the present invention;

Figure 2 depicts a second view of the first frame;

Figure 3 depicts a sealing lip without a frame;

Figure 4 depicts a sealing lip and frame combination;

20 Figure 5 depicts a second view of a sealing lip and first frame combination;

Figure 6 depicts a third view of a sealing lip and first frame combination;

Figure 7 depicts a first view of a second frame;

25 Figure 8 depicts a second view of the second frame;

Figure 9 depicts a first view of a combination of the sealing lip and second frame; and

Figure 10 depicts a second view of the combination of the sealing lip and second frame.

30

Throughout the specification, like reference numerals refer to equivalent elements. Figure 1 depicts a first view of the first frame 10. The frame may be made of metal and/or other

such material. As shown, first frame 10 includes walls 14 defining an internal cavity 12 and an external region 16. The internal region includes an internal border 18 surrounding cavity 12. Border 18 includes openings 20. The 5 openings may be of any number as required by design. In this embodiment, the openings 20 are shaped as open V's with the bottom most point of the V facing cavity 12. As depicted, the first frame 10 includes eight openings. Other shapes are also applicable as required by design. A border of walls 14 10 proximate to the external region 16 are bent or folded over in an approximate perpendicular angle. The border walls continue in a direction away from a plane comprising cavity 12 and will herein be referred to as secondary walls 22. Secondary walls 22 include a variety of shapes, continuous or 15 discontinuous, with aperture 24 or without 26, and other design features as may be required by application. Utility of the secondary walls is to affix to other elements (not shown) so as to secure the frame (and whatever may be attached to the frame) to the other elements. The first 20 frame may further include openings 28 along side walls 30, and in a direction away from cavity 12. The openings 28 facilitate handling of the frame.

Figure 2 depicts the frame of figure 1 with measurement values assigned to certain features. The measurement values 25 are by way example only, approximate, and do not restrict the invention to only these values. Other values are available as would be imagined by one skilled in the art. The open V openings 20 are depicted as defining an angle of ninety degrees 32. A center line 34 of openings 20 is located 30 approximately 12 mm from a nearest side wall 30. Openings 20b not proximate to a side wall have a distance 42 of 25 mm between their center lines 36 and other openings 20a closer to side walls 30. The openings 20 define a depth 38 of

1.5 mm into walls 14, as well as an opening length 40 of 0.5 mm. Cavity 12 has a center line 44 which is 10.25 mm from a perpendicular lateral internal wall surface 46.

Figure 3 depicts a sealing lip 50 without a frame. The 5 sealing lip is associated with first frame 10. The sealing lip may comprise thermoplastic elastomer. As is known in the art, thermoplastics are materials that soften or melt when heated and harden when cooled. The term elastomer, a contraction of the words elastic and polymer, is defined as a 10 substance that can be stretched at room temperature to at least twice its original length and, after having been stretched and the stress removed, returns with force to approximately its original length in a short time. Thermoplastic polymers consist of long polymer molecules that 15 are not linked to each other. i.e., have no cross-links. They are often supplied as granules and heated to permit fabrication by methods such as molding or extrusion. Returning to figure 3, the sealing lip 50 comprises walls 52 defining an internal cavity 54 and an external region 56. 20 The sealing lip is a single piece which may be made from injection molding and/or spraying, techniques well known in the art. The walls comprise a dove tail formation, extending outward from the internal cavity 54 towards external region 56 in their respective directions and on either side of walls 25 14. The dove tails form a V shape 58. Along the V shape 58 are spacers 60 which corresponds in size and number to openings 20. The spacers 60 facilitate gripping by the thermoplastic elastomer of sealing lip 50 to frame 10 during cooling of the elastomer. Cavity 54 corresponds to cavity 12 30 of the first frame 10. Likewise, walls 52 correspond to frame walls 14. When formed, sealing lip 50 is molded and/or sprayed about first frame 10. The V shape 58 includes two arms 58a and 58b. As depicted, a forward direction 62 is in

a direction towards the bottom of the figure. Arm 58a, facing forward, is longer than arm 58b facing rearwards 64.

A cross section of frame 10 and sealing lip 50 is depicted in figure 4. The shaded areas 66 indicate portions 5 which receive the injected molded or sprayed thermoplastic elastomer. The thickness 68 of arm 58a may be 0,5 – 3,0 mm and the thickness 70 of arm 58b may be 0,5 – 3,0 mm.

A side view of the frame 10 sealing lip 50 combination is depicted in figure 5, wherein it may be seen that frame 10 10 encases sealing lip 50. A component may be mounted with the sealing lip and attached to another element via frame 10.

Figure 6 depicts an elongated view of the frame sealing lip combination of figure 5. Herein, the secondary walls 22 are more visible.

15 Figure 7 depicts a perspective view of a second frame 72. Second frame 72, as first frame 10, includes walls 74 defining an internal cavity 76 and an external region 78. Furthermore, secondary walls 80 are also defined by walls 74, bent at substantially 90 degrees to a plane include cavity 20 76. Length of walls 74 between an internal border defining cavity 76 and border indicating the above bending, is 4.15 mm. The length of the second frame 72 is 79 mm plus or minus 0.15 mm. The aforementioned measurement values are descriptive only, with other values considered within the 25 scope of the invention, the other values known to one skilled in the art. Side openings 82 are also depicted facing away from cavity 76.

Figure 8 shows another perspective view of the second frame 72 of figure 7. Figure 9 depicts a perspective view of 30 a combination of sealing lip 50 as may be applied to second frame 72. The features of sealing lip 50 remain the same as detailed above. Lastly, figure 10 depicts a cross section of the combination of sealing lip 50 and second frame 72.

## Claims:

1. A component carrier comprising a frame and a doubled sided seal, the seal providing mechanical force tolerance and compensation for the component encased in the skeleton frame and seal, characterized in that:
  - the seal comprises thermoplastic elastomer, and
  - the frame comprises recesses for the elastomer to adhere to when the elastomer undergoes a cooling process.
- 10 2. The component carrier according to claim 1, wherein the seal comprises a single piece.
- 15 3. The component according to claims 1 and 2, wherein the seal is applied to the frame by one of spraying and injection molding.
4. The component carrier according to claims 1-3, wherein the frame comprises walls defining an interior opening and 20 the recesses are located along the interior opening.
5. The component carrier according to claims 1-4, wherein the recesses are open V shaped.
- 25 6. The component carrier according to claims 1-5, wherein the seal is dovetailed comprising two extending arms, a first of the two arms being longer than a second.
- 30 7. The component carrier according to claim 6, wherein the first arm faces a front, the front defined by application of the component.

8. The component carrier according to claims 1-7, wherein  
the component is a display.

5 9. A method of making a component carrier, characterized  
by:

- injection molding and/or spraying a seal around a frame,  
the frame comprising walls defining an interior cavity with  
recesses along cavity walls, and the seal being molded in  
10 the shape of a dovetail,
- cooling the injection molding such that the molding adheres  
to the recesses.

10. The method according to claim 9, wherein the injection  
15 molding comprises thermoplastic elastomer.

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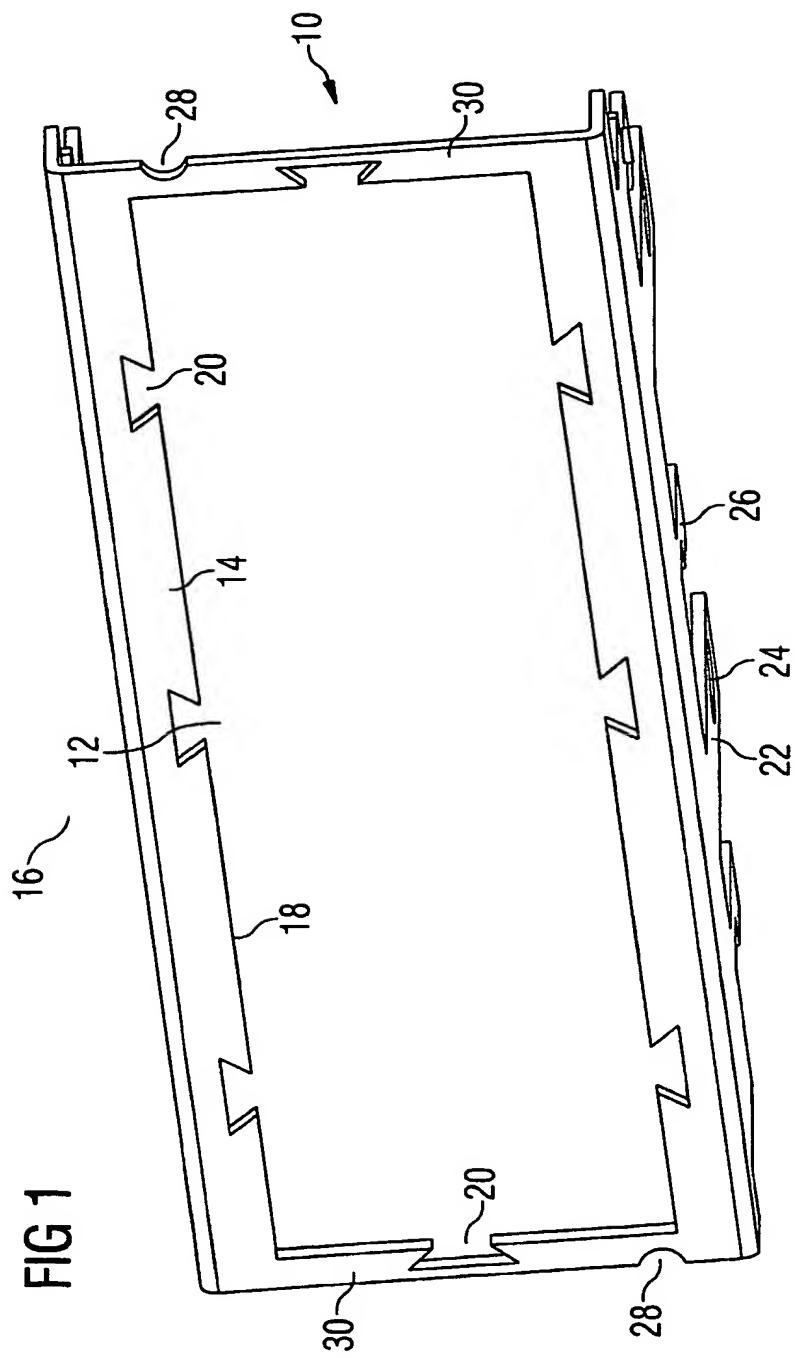


FIG 1

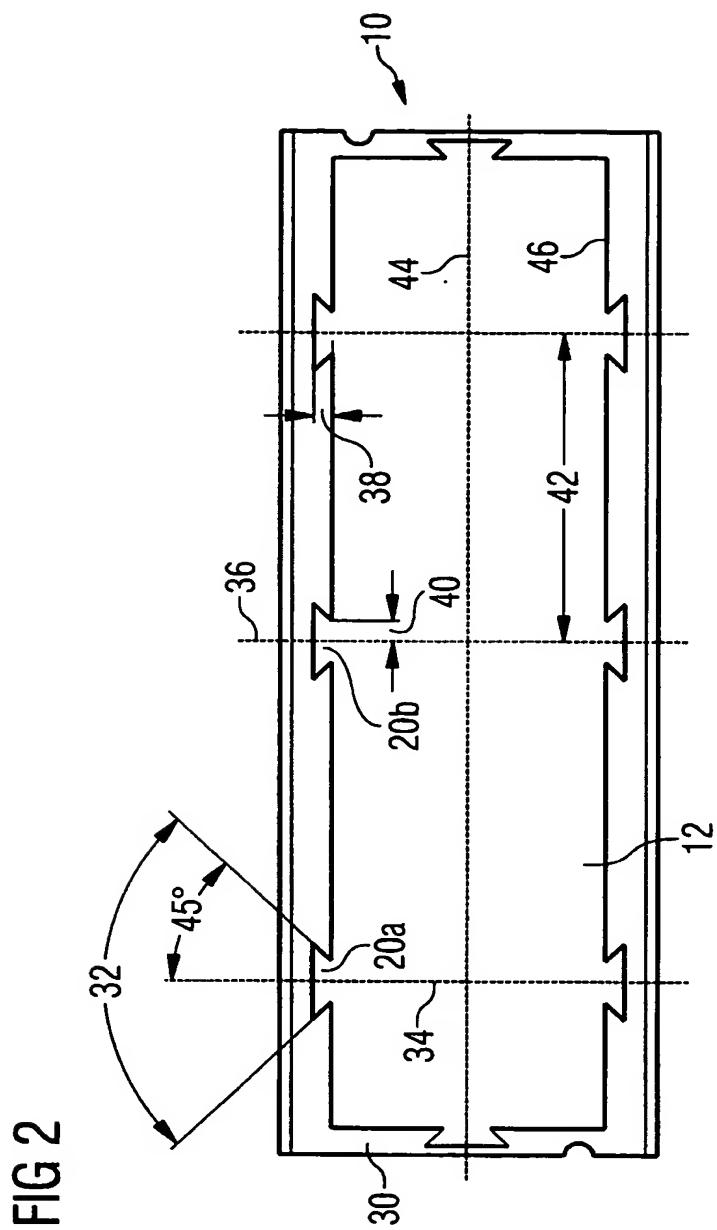
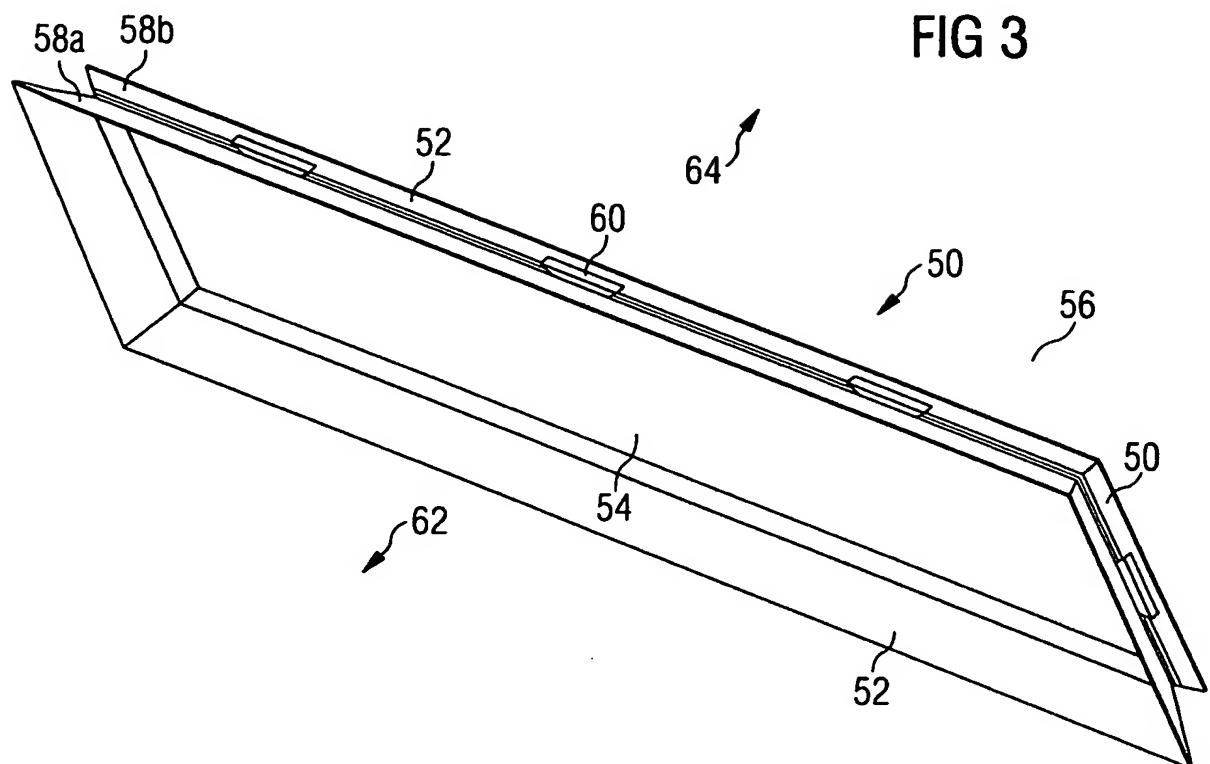
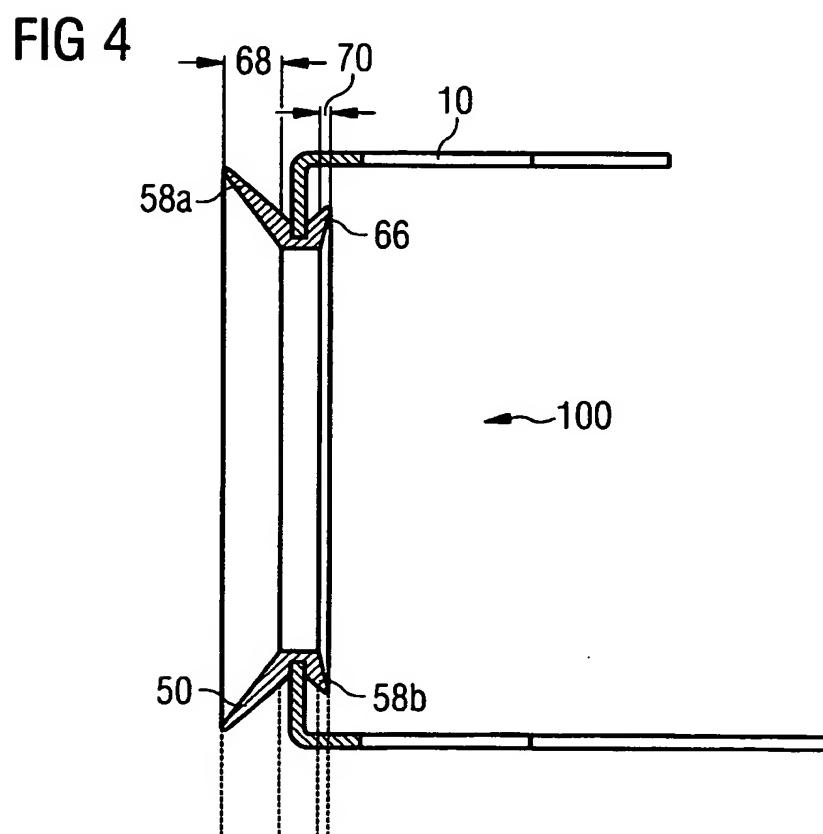


FIG 2

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**FIG 3**



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FIG 5

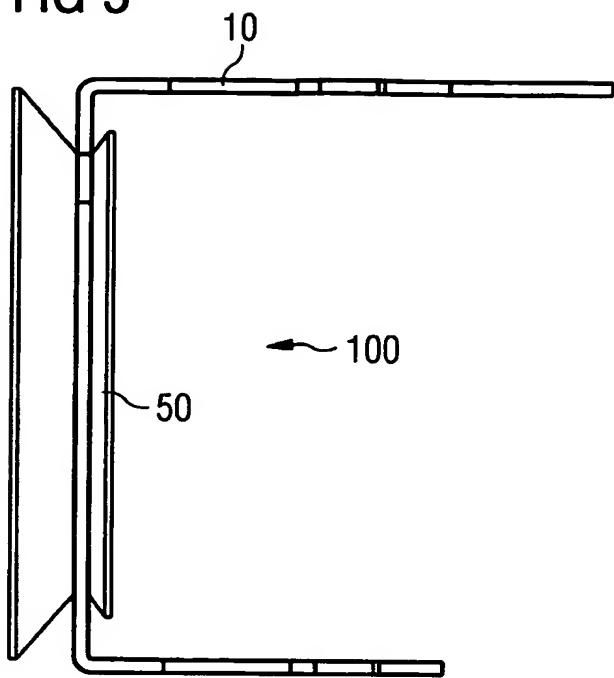
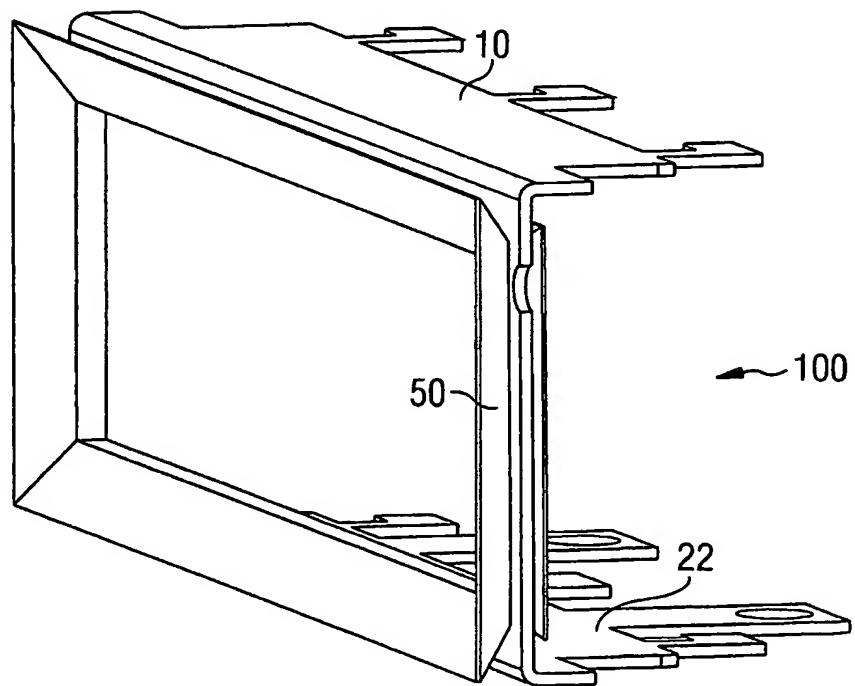
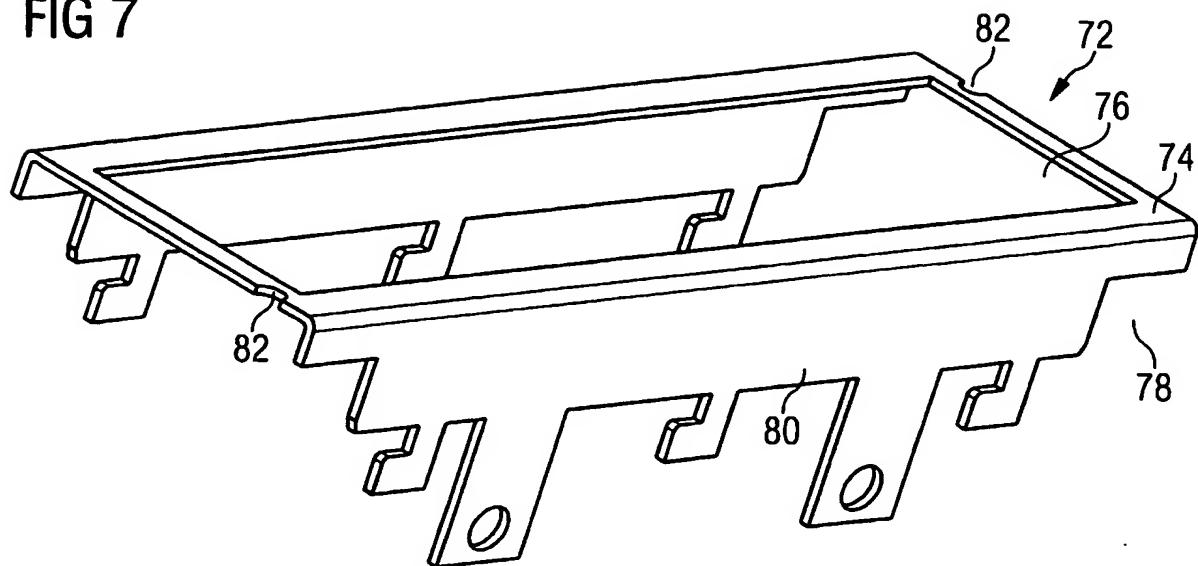
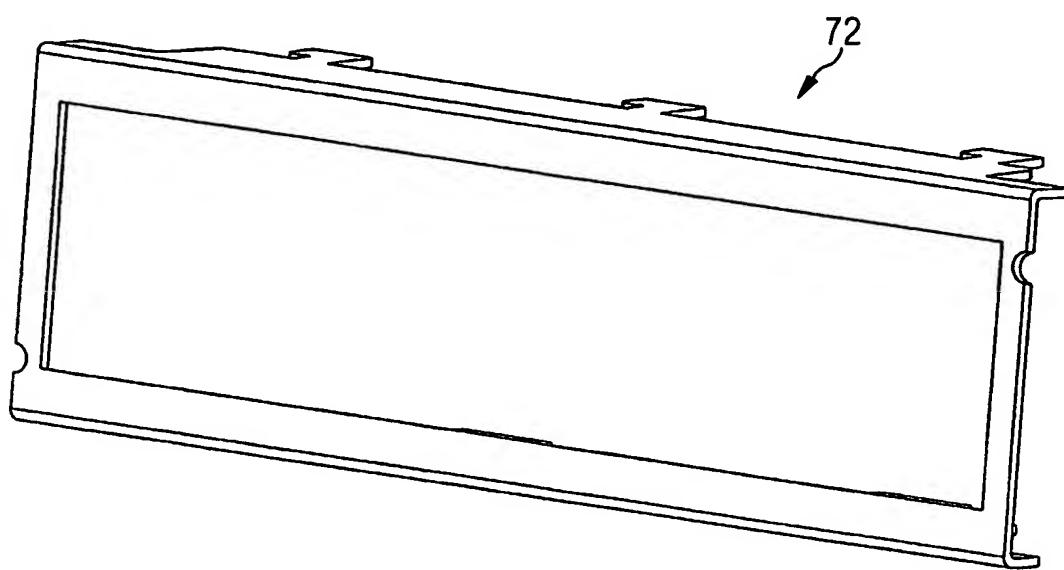
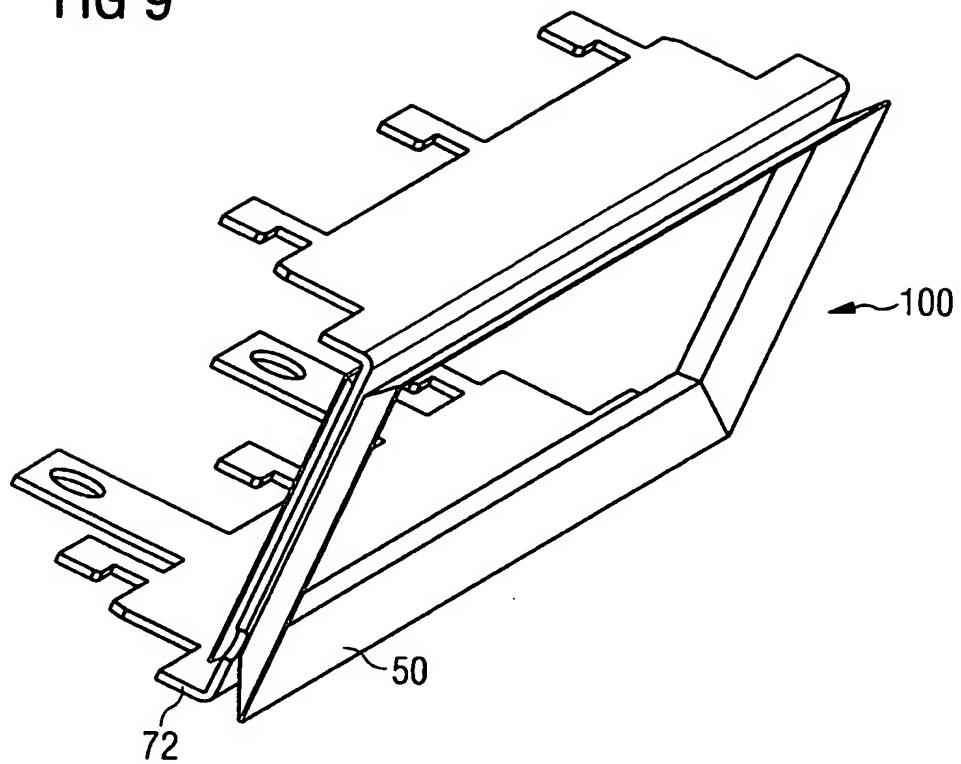
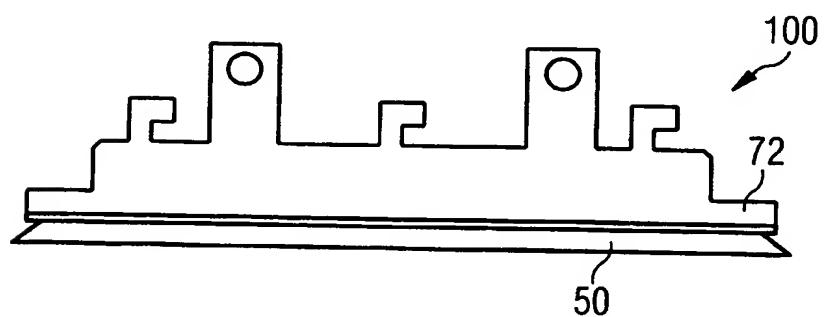


FIG 6



**FIG 7****FIG 8**

**FIG 9****FIG 10**

## INTERNATIONAL SEARCH REPORT

International Application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H05K7/02 G02F1/13

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H05K G02F G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 03, 31 March 1997 (1997-03-31) -& JP 08 313880 A (ROHM CO LTD), 29 November 1996 (1996-11-29) abstract -----	1-10
A	US 5 568 357 A (KOCHIS GARY ET AL) 22 October 1996 (1996-10-22) abstract; figures 1,6,7 column 5, line 48 - column 6, line 8 -----	1-10
A	DE 34 08 176 A (SIEMENS AG) 19 September 1985 (1985-09-19) the whole document ----- -/-	1-10

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Patent family members are listed in annex.

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Date of the actual completion of the International search

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## INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 911 675 A (BOSCH GMBH ROBERT) 28 April 1999 (1999-04-28) paragraphs '0031! - '0048!; figures 1,3 -----	1-10
A	US 4 357 061 A (CROSBY JOHN B) 2 November 1982 (1982-11-02) column 2, line 23 - column 4, line 50; figures 1-3 -----	
A	US 6 108 213 A (YAMAMOTO SATORU ET AL) 22 August 2000 (2000-08-22) column 1, lines 10-35 column 3, line 47 - column 4, line 37 -----	
A	US 4 619 431 A (MATSUI KAZUHIRO ET AL) 28 October 1986 (1986-10-28) column 2, lines 25-60; figures 1-3 -----	

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No  
PCT/EP2004/051064

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 08313880	A	29-11-1996	NONE		
US 5568357	A	22-10-1996	NONE		
DE 3408176	A	19-09-1985	DE	3408176 A1	19-09-1985
EP 0911675	A	28-04-1999	DE	19747288 A1	29-04-1999
			EP	0911675 A2	28-04-1999
			JP	11202788 A	30-07-1999
US 4357061	A	02-11-1982	NONE		
US 6108213	A	22-08-2000	JP	2944641 B2	06-09-1999
			JP	2000013271 A	14-01-2000
			AU	751420 B2	15-08-2002
			AU	3393599 A	06-01-2000
US 4619431	A	28-10-1986	JP	60101788 U	11-07-1985
			DE	3445379 A1	27-06-1985
			DE	8436424 U1	28-03-1985
			FR	2561422 A1	20-09-1985
			GB	2151833 A ,B	24-07-1985